

Simulation

What is it?

Simulation is the virtual modeling of complex real-world systems.

Many business processes and systems are so complex, with seemingly endless interdependencies and non-linearities, that they cannot be adequately represented using typical mathematical models.

Simulation is a computer-based tool which generates a virtual environment in which such intricate systems, and the associated uncertainty within them, can be **fully modeled** and **better understood**, in order to make **better decisions**.

Using probability distributions to represent the random influences on a system, simulation models are executed for a large number of 'realizations'. The results are then compiled to gain an overall picture of the expected system behavior. Statistics can be drawn from this data to form conclusions about the likelihood of particular outcomes under various starting conditions and assumptions. In this manner, simulation provides a window into uncertainty and a 'sand-box' in which one can try out ideas without disrupting live systems.

Late 1940s - John von Neumann conceives of the idea of simulation to study the effectiveness aircraft bombing.

Present Day

"The potential of simulation for business process modeling is beginning to be recognized by the business community."

Modern militaries around the world use simulation technology extensively to train soldiers, draft policies and make operational decisions. Increasingly, businesses are learning that simulation can be used in similar ways to improve the way they run their operations and make decisions. Simulation is being used to:

Don't be overwhelmed by complexity - **Gain insight** with simulation.

- Assess risk
- Develop strategy
- Test without impacting operations
- Experiment with 'what-if' scenarios
- Gain visibility
- Plan growth and capital expenditures
- Troubleshoot operational issues

Success Stories

Some recent ground-breaking simulation applications:

- Peugeot Citroën to increase throughput with minimal capital investment, adding \$130 M to its bottom line.
- Visteon Chassis Systems to develop a decision-support system which helped increase productivity by 30%.
- The US Department of Energy to analyze nuclear waste disposal and related policy options.
- Canada Post to help optimize its parcel delivery network.
- UPS to reduce aircraft turnaround time from hours to minutes.
- Continental Airlines to improve staff resource allocation by 14%.



Sylogix's Simulation Process

1. Consultation

- A co-client exploration of the decision-making problem at hand is performed.
- The appropriate simulation technology and suitable level of abstraction are determined.
- The system boundaries are defined.
- The data requirements and availability are assessed.

2. Modeling

- The structure of the system is codified into a simulation model
- Statistical distributions are fit to data in order to drive the randomness in the model
- The model is validated and incrementally improved until its behaviour replicates that of the system under study.

3. Analyses

- The simulation is run for a large number of realizations to achieve an understanding of the system behaviour over time.
- Initiating the model with different starting conditions, or changing variables of interest throughout a run (if appropriate), allows the user to perform scenario analysis, evaluate risk and study the effect of new policies.
- An analysis determines the distribution of the likelihood of outcomes and the sensitivity of the system to variations on particular inputs.

4. Solution Delivery

- Using customized and convenient input mechanisms, as well as reporting functionality based on the client's needs, we deliver a complete end-to-end decision support tool.
- A detailed report explaining the structure of the simulation model and its underlying assumptions, as well as a user's guide describing how to interact with the tool are always provided to ensure complete understanding and satisfaction.

Benefit from Simulation

Gain insight

Animate proposed production/business processes. Learn about the dynamics. Regain sight of the "big picture".

Improve your processes

Test new ideas without disrupting your operations. Identify bottlenecks and constraints.

Mitigate risk

Study the extreme cases to understand all the factors involved.

Save time and money

Evaluate process designs before implementing them. Train managers before plant start-up. Develop, plan, test and optimize operations before committing to execution.

Regain control

Assert control over your complex system. Gain reliable data on which to base decisions. Plan for disaster recoveries.